

different from said second lamp device, the tuning device emitting localized and focused light energy in a manner for more uniformly heating the semiconductor wafer.

REMARKS

Currently, claims 32, 33, 35 through 56, and 58 through 73 remain pending in the present application, including independent claims 32, 43, 51 and 60. Claims 60 through 73 have been indicated as being allowable.

In the latest Office Action, the remaining claims were rejected under 35 USC §102 or under 35 USC §103 in view of U.S. Patent No. 5,635,409; U.S. Patent No. 5,367,606; and U.S. Patent No. 5,446,825 all to Moslehi. As now amended, however, it is believed that the claims patentably define over the cited references either alone or in combination.

All of the claims are directed to an apparatus for heat treating semiconductor wafers. The apparatus includes a thermal processing chamber adapted to contain a semiconductor wafer and a heating device in communication with the thermal processing chamber. The heating device includes a plurality of light energy sources. In accordance with the present invention, the heating device further includes at least one tuning device positioned amongst the light energy sources. The tuning device is designed to change the irradiance distribution of the light energy sources in a manner for more uniformly heating the semiconductor wafer.

As now amended, claim 32 requires the tuning device to be a light energy source spaced from at least one optical element which comprises at least one focusing lens. The optical element is configured to focus and direct light energy being emitted by the light energy source onto the semiconductor wafer. In independent claim 43, the tuning device comprises a laser diode. Independent claim 51, on the other hand, has been amended to require that the plurality of light energy sources are horizontally oriented with respect to the semiconductor wafer. The

tuning device is a lamp device that is different in construction than the horizontally oriented light sources and is now required to emit localized and focused light energy in a manner for more uniformly heating the semiconductor wafer.

In comparison, none of the cited Moslehi references disclose or suggest a tuning device that comprises a light energy source spaced from a focusing lens nor do the references disclose or suggest the use of a tuning device that comprises a laser diode. Finally, all of the light sources disclosed in the Moslehi references are vertically oriented with respect to a wafer. In contrast, claim 51 now requires that the plurality of light energy sources be horizontally oriented with respect to the wafer and be present in conjunction with at least one tuning device that emits localized and focused light energy. In view of the above differences, it is believed that claims 32, 43 and 51 patentably define over each of the cited Moslehi references.

In summary, applicants submit that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. In order to provide the Examiner with sufficient time to consider this amendment, this response is being filed with a Notice Of Appeal. Should there be any questions, or issue remaining after consideration of this amendment, Examiner Nguyen is invited and encouraged to telephone the undersigned as his convenience.

Please charge any additional fees to deposit account No. 04-1403.

Respectfully submitted,

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APPENDIX A.

Amended Claims for U.S. Serial No. 09/226,396 (Attorney Docket No. AGX-14-CPA)

32. (Amended) An apparatus for heat treating semiconductor wafers comprising:
a thermal processing chamber adapted to contain a semiconductor wafer; and
a heating device in communication with said thermal processing chamber for
heating a semiconductor wafer in said chamber, said heating device comprising:

(a) a plurality of light energy sources configured to emit light energy
onto said semiconductor wafer, said light energy sources being positioned so as to form an
irradiance distribution across a surface of said semiconductor wafer; and

(b) at least one tuning device positioned amongst said light energy
sources, said tuning device comprising a light energy source spaced from at least one optical
element comprising at least one focusing lens [a light refracting device], said optical element
being configured to focus and direct light energy being emitted by said light energy source onto
said semiconductor wafer in a manner for more uniformly heating said semiconductor wafer.
37. (Amended) An apparatus as defined in claim 32 [34], wherein said light energy
source and said at least one focusing lens are mounted on a support structure, said support
structure being movable for directing light energy emitted from said light energy source onto a
determined location on said semiconductor wafer.
51. (Amended) An apparatus for heat treating semiconductor wafers comprising:
a thermal processing chamber adapted to contain a semiconductor wafer; and
a heating device in communication with said thermal processing chamber for
heating a semiconductor wafer contained in said chamber, said heating device comprising:

(a) a plurality of light energy sources configured to emit light energy onto said semiconductor wafer, said light energy sources being positioned so as to form an irradiance distribution across a surface of said wafer, the light energy sources being horizontally oriented with respect to the semiconductor wafer, each of said light energy sources comprising a first lamp device; and

(b) at least one tuning device positioned amongst said light energy sources, said tuning device comprising a second lamp device, wherein said first lamp device is different from said second lamp device, the tuning device emitting localized and focused light energy in a manner for more uniformly heating the semiconductor wafer.]